afterward applied a similar technique to the differential diagnosis of equine encephalomyelitis, human encephalitis and lymphocytic choriomeningitis, using the more delicate complement-fixation reaction. Howitt tested extracts of the fixed tissues of virus-infected guinea pig and found highly specific factors that would react with homologous hyperimmune guinea-pig serum. The active component in such extracts readily passes through the pores of a medium fine gradocol membrane, and thus may be completely separated from the specific virus causing the disease.

Smadel [5] and his coworkers of the Rockefeller Institute have accomplished the same separation of the "soluble substance" from the accompanying virus by ultracentrifuge methods. In lymphocytic choriomeningitis infections, for example, the washed virus fixes complement poorly, while a high complement-fixing titer is shown by the soluble tissue component. This specific soluble antigen is present in virus-free extracts of the fixed tissues of guinea pigs, mice, and monkeys during the initial acute stages of experimental infection, and is set free in the serum of patients during the early acute stage of lymphocytic choriomeningitis. Antibodies against this hypothetical denatured tissue protein begin to appear early in the human infection, increasing to a maximum by the early convalescent period and disappearing quantitatively with full convalescence. After their disappearance, viricidal antibodies alone are demonstrable and may persist for at least five years.

This temporal separation of transient and permanent specific antibodies was confirmed by experimental lymphocytic choriomeningitis inoculations of guinea pigs. Tested with soluble tissue antigens, complement-fixation antibodies begin to appear two weeks after the experimental inoculation, reach a maximum by the sixth week, after which they decreased in titer, practically disappearing by the thirty-second week. Neutralizing or viricidal antibodies are not demonstrable till the eighth week, but remain at apparently their full concentration for at least thirty-two weeks, *i. e.*, till after the concomitant precipitin has disappeared. Throughout the period of the experimental infection the concomitant precipitin and viricidal antibodies have no quantitative relationship to each other, being apparently wholly independent serological variables. Mice, similarly inoculated, develop complement-deviating antibodies, but at no time show a viricidal humoral immunity. Nevertheless, the mice become immune, suggesting that the viricidal serum component is a nonessential factor in acquired antiviral immunity in this animal species. That the virus-free soluble specific tissue component is autoantigenic, was shown by its injection into partially immunized guinea pigs, which injection was followed by a marked increase in complement-fixation titer.

Proof of the existence of immunologically inert, secondary antigens and antibodies in certain virus diseases goes far to fulfill prophecies made by certain immunologic theorists [6] fifteen years ago, before the present almost unanimous discard of the historically important specific receptor hypothesis (Ehrlich theory). Whether or not similar concomitant antigens and antibodies are of equal clinical interest in tuberculosis, syphilis and other prolonged microbic infections, is now under investigation in clinical laboratories.

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[5] Smadel, J. E., Baird, R. D., and Wall, M. J.: Jour. Exper. Med., 70:53, 1939.

[6] Manwaring, W. H.: Jour. Immunol., 12:177, 1926.

RADIO-ACTIVATED ELEMENTS IN MEDICINE

When an element is rendered radio-active by bombardment in the cyclotron, it may remain the same chemically or it may be changed to a different element. Its chemical nature has only this importance for biology and medicine, namely, that it may determine its distribution within the body. Any pharmacologic effect which may be characteristic of its chemistry is going to be quite overwhelmed by the very violent biologic effect of its radiation. The radiations from the different radio-active substances are extremely similar and not identical in their biologic effect. Therefore, an understanding of the effect of the radio-active substance depends upon an understanding of the biologic effect of radiation, and the varying radio-sensitivities of the different cells and tissues of the body. The particular radio-active element used will be important from just two standpoints, namely, that its chemical nature will determine the distribution of the radiation through the body, and that the rate of decay will determine the distribution of the radiation effect in time.

Inasmuch as we are well aware of the profound effects of radiation on the body and know that effects can be deleterious or dangerous, therefore the clinical use of artificially radio-active substances for therapeutic purposes must be considered a potentially dangerous clinical experiment and should only be undertaken by those who are well acquainted with the effect of radiation on the human body, and only after thorough study of the effects of the particular radio-active substance in question, investigated by tests in animals.

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Why Babies Smile.—There is no evidence to indicate that the smiles of very small babies are caused by conscious thinking, *Hygeia, The Health Magazine* states in a recent issue in answer to an inquiry.

"Observation with a movie camera has recorded that young infants often smile in their sleep," *Hygeia* continues, "but seldom when they are awake unless the skin around the zone near the mouth is gently stroked. The smile seen on the baby during sleep is thought to be of reflex origin, an unconscious act of which the baby may be entirely unaware. It should be remembered that the mouth and the lips are the most sensitive parts of the body in early infancy. Stimuli in this area, from within and without, are readily received and the reflex movement of some of the facial muscles respond to produce the smile."